Application Number: T3-00009 **Scientific Score**: 72

Specific names of individuals and institutions are blacked out to preserve applicant confidentiality where possible.

Title: [redacted] Stem Cell Biology Training Program

Proposal Abstract as Submitted by Applicant

Human embryonic stem cells (hES cells) are immortal pluripotent cells with the potential to differentiate into derivatives of all three germ layers. They offer enormous potential in the emerging field of regenerative medicine and for illuminating basic developmental biology in vitro, although regulatory mechanisms that control their differentiation are not understood. Despite this potential, due to the fact that they originate from preimplantation embryos, they have generated great ethical controversy. To help young scientists sort out fact from fiction, and to offer them training as well as ethical guidance in hES research, we propose a level III training program for pre and post-doctoral scientists. The goal of the training program is twofold: 1) to teach young scientists to think critically and independently about hES cell research and 2) to apply this knowledge to the practical applications of hES cells in regenerative medicine. The focus of research will be an interdisciplinary approach to understanding how hES differentiation can be regulated to produce ocular cells, which might be useful in the treatment of eye disease. The research program will take advantage of unique strengths present at [redacted] in the Department of Molecular, Cellular and Developmental Biology, the Neuroscience Research Institute, the Center for the Study of Macular Degeneration, and the College of Engineering. Our researchers and collaborators have published the first paper on human retinal cells derived from hES cells and are now testing them in preclinical animal models of retinal disease. We also have assembled a world class team of ethicists to teach the young scientists how to judge and make the appropriate moral and ethical decisions they may encounter in this area of research. This training program should prepare the trainees for a rewarding career in stem cell research and provide them with a rare early opportunity to see this basic research translated into actual animal models of human disease.

Benefit of this Program to California

This program will benefit the people and the state of California by providing high-quality training in the scientific, clinical, social, and ethical aspects of stem cell research to the scientists and clinicians who will develop and apply future therapies in this rapidly emerging field.

Summary of Review

This type III proposal seeks to train scholars at both the pre-doctoral and post-doctoral levels. The program sharply focuses on understanding how human embryonic stem cells can differentiate into ocular cells that might be used to treat eye disease. The two required courses, Stem Cell Biology in Health and Disease and the Ethics of Human Embryo Research, are well described and seem highly appropriate. Experts in the field, including invited guests, will give lectures. A monthly seminar series will focus on recent advances in stem cell biology. The program director is a department chair at the institution and is

an expert in retinal differentiation of stem cells. A scientific oversight committee of three participating members will be elected annually and oversee the program and select trainees. The proposal identifies ten faculty members as mentors or co-mentors. Several are senior and well funded with NIH support, whereas two are quite junior. Others have recently relocated from industry. In general, the research focus of the proposed mentors is highly relevant to stem cell biology and the combination of academic and industrial experience is attractive. The relatively limited number of mentors is a weakness of the program, but minor in the context of the overall strength of the program. Pre-doctoral applicants will be drawn from students in several graduate departments. The quality of the graduate training programs at this institution seems quite strong and a number of endowed fellowships are available to attract particularly talented students. The Center for the Study of Macular Degeneration provides an appropriate environment – with the potential for clinical applications – for one of the focuses of the program. The environment for the proposed program is very strong in stem cell research and the general academic environment of the institution is also conductive to the development of scholars.

Overall Strengths and Weaknesses

Strengths of this program are its sharp focus, the high quality of the training environment, and the record of accomplishment of many of the proposed mentors in research relevant to human embryonic stem cell differentiation. The proposed coursework is well described and represents strength of the proposal. A weakness is the relatively limited number of mentors and the junior status of two, but this is considered a minor weakness in the context of the overall strength of the program.

Recommendations

Highly meritorious and recommended for funding.

	Pre	Post	Clinical	Total
Fellows Requested:	2	4	0	6
Fellows Recommended:	2	4	0	6

	Year 1	Total
Budget Requested:	$ 431,823	$ 1,343,859
Budget Recommended:	$ 431,823	$ 1,343,859